Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Date\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

# Genetics Problems in Agriculture[[1]](#endnote-1)

**Monohybrid Cross**

1. Holsteins being black and white is dominant over being red and white. What are the chances of a homozygous dominant bull and a heterozygous cow having a calf that is red?

\_\_\_\_\_\_\_x\_\_\_\_\_\_\_\_ Phenotype:

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Genotype:

# 2. Angus cattle being black is dominant over being red. What are the chances of a heterozygous bull and a heterozygous cow having a calf that is black?

\_\_\_\_\_\_\_x\_\_\_\_\_\_\_\_ Phenotype:

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# Genotype:

1. Curly Calf Syndrome is a lethal genetic defect found in Angus cattle caused by a recessive allele. Calves born with this syndrome are born dead with bent and twisted spines. What would be the likelihood that a carrier bull (Cc) mated to a carrier cow (Cc) produced a calf that did not carry the gene.

\_\_\_\_\_\_\_x\_\_\_\_\_\_\_\_ Phenotype:

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# Genotype:

# Test Cross

4. Woolly coat (W) in sheep is dominant over straight-haired coat. How would a sheep farmer find out if the ram he bought at the auction was homozygous dominant for the woolly coat trait?

\_\_\_\_\_\_\_x\_\_\_\_\_\_\_\_ Phenotype:

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Genotype:

**Codominance**

5.Coat color in Herford cattle is a codominant trait. Red coat (R ) and white coat (W) alleles blend in the heterozygous condition to produce a roan or red-and-white spotted coat (RW). If a bull with a red coat and a cow with a roan coat are mated, what will be the coat color of their calves?

\_\_\_\_\_\_\_x\_\_\_\_\_\_\_\_ Phenotype:

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Genotype:

6. Sickle-cell anemia is a disorder inherited by a homozygous recessive genotype (ss). Afflicted individuals have abnormal hemoglobin pigments in their red blood cells, causing the RBCs to be misshapen or sickled. Carriers of this trait (Ss) are partially affected as half of their hemoglobin is abnormal and may suffer some symptoms. What are the chances that two carriers will produce a child who is afflicted with the disorder (ss)?**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

\_\_\_\_\_\_\_x\_\_\_\_\_\_\_\_ Phenotype:

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Genotype

# Sex Determination

7. Your award winning cow and bull have had 10 calves, 3 bulls and 7 heifers. What is the probability that they will have a bull for their eleventh calf? (Male genotype is XY and female genotype is XX)

\_\_\_\_\_\_\_x\_\_\_\_\_\_\_\_ Phenotype:

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# Genotype:

# x-Linked

8. In chickens, a dominant gene (F) on the X chromosome results in silver feathers. Its recessive allele results in gold feathers.

1. What are the two possible genotypes of a silver hen?\_\_\_\_\_\_\_\_\_\_ & \_\_\_\_\_\_\_\_\_
2. What are the 2 possible F1 generations that would result from a cross between a golden rooster and a silver hen?

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9. Hemophilia or the “bleeder’s disease” is a genetic disorder in which blood does not clot. In the past, hemophiliacs died at a young age. Today, afflicted individuals can have their life expectancy increased by having transfusions of clotting factor. This disorder is carried as a recessive allele (h) on the X chromosome.

1. If a normal male and a woman who is a carrier for the trait produce offspring, what are the chances of having a male child with hemophilia?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. A female child with hemophilia?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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# Dihybrid Cross – assume the two traits are on different chromosomes

10. In some dogs, barking (B) when trailing a scent is due to a dominant allele. Other dogs are silent when trailing. Erect ears (E) are dominant to floppy ears. If two heterozygous erect-eared barkers (BbEe X BbEe) produce puppies, what traits would you expect to see in their offspring? (Possible phenotypes are erect ear barker, erect ear silent, floppy ear barker, and floppy ear silent)

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Erect Ear Barkers:\_\_\_\_\_\_, Erect Ear Silent:\_\_\_\_\_\_, Floppy Ear Barker:\_\_\_\_\_\_\_, Floppy Ear Silent:\_\_\_\_\_\_\_

11. In race horses, black hair (F) and a trotting gait (G) are dominant traits. Recessive traits are chestnut hair (f) and a pacing gait (g). Determine the possible offspring from a cross between 2 heterozygous black trotters (FfGg)

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Black Hair Trotter:\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_:\_\_\_\_\_\_,

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_:\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_:\_\_\_\_\_\_\_\_

1. Madlem, Amber (2008).Ag Genetics Problems. *Central Valley High School Agriculture Department*. [↑](#endnote-ref-1)